

Understanding Database Concepts

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Flat File Systems vs. Relational Databases

Databases store and manage data efficiently. Two common types are **Flat File Systems** and **Relational Databases**.

Feature	Flat File System	Relational Database
Structure	Simple, stores data in a single file	Organized into tables with rows and columns
Data Redundancy	High (data is often repeated)	Low (data is stored efficiently using relationships)
Relationships	No relationships between data	Uses primary and foreign keys to link tables
Example Usage	CSV files, text files	MySQL, PostgreSQL, SQL Server
Drawbacks	Hard to manage large data, lacks security	More complex, requires a database management system

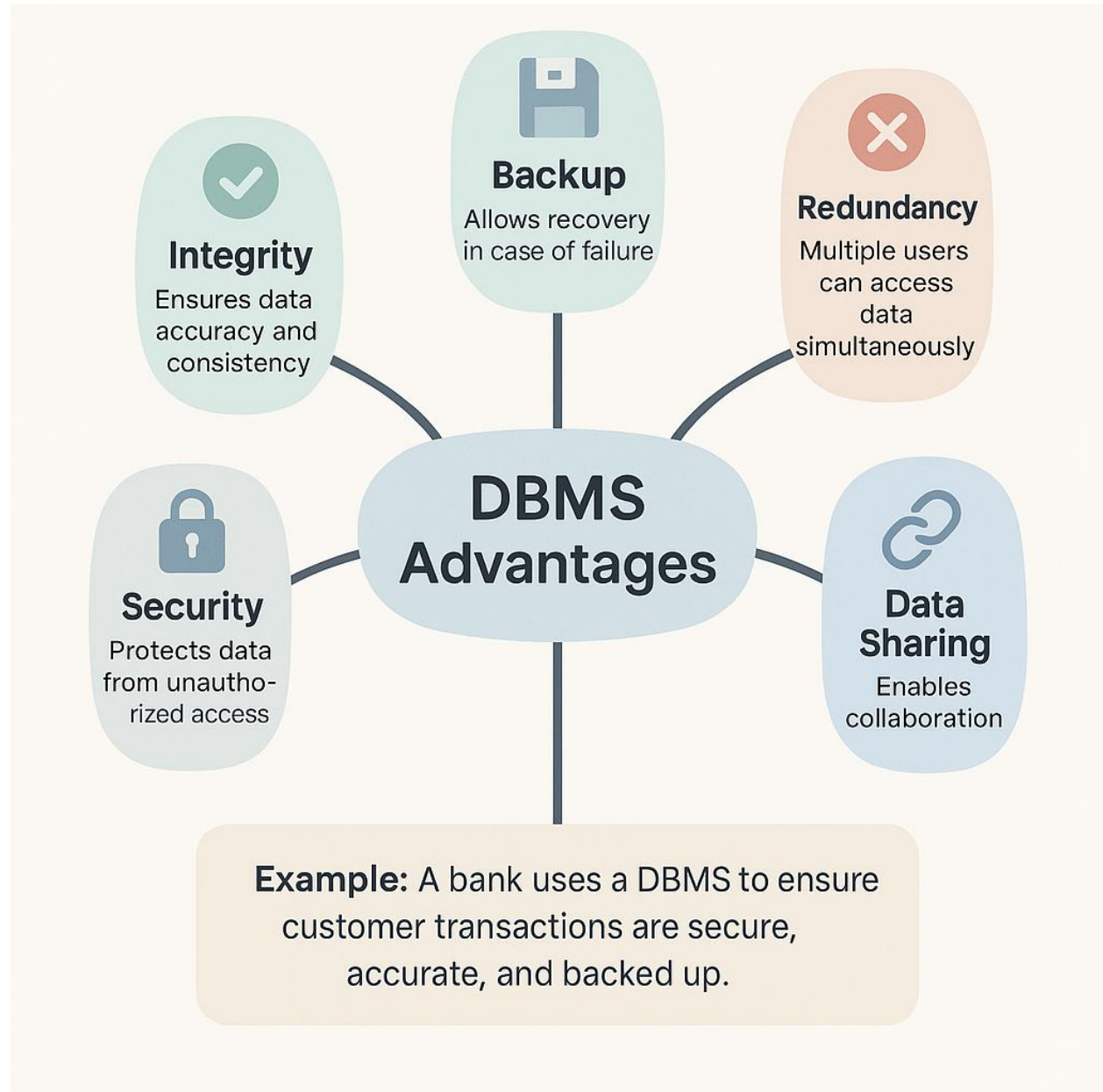
Example

Imagine a company storing employee records:

- **Flat File System:** Each employee's details are stored in a separate text file.
- **Relational Database:** Employee details are stored in a table with relationships to other tables (e.g., department, salary)

DBMS Advantages – Mind Map

A **Database Management System (DBMS)** offers several advantages.




Roles in a Database System

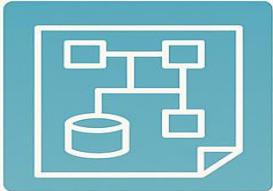
Different professionals manage databases. Here’s a breakdown of key roles:

Role	Responsibilities
System Analyst	Analyzes business needs and database requirements
Database Designer	Designs the structure of the database
Database Developer	Builds and optimizes the database
Database Administrator (DBA)	Manages security, backups, and performance
Application Developer	Creates applications that interact with the database
BI Developer	Analyzes data for business insights


DATABASE-RELATED ROLES




SYSTEM ANALYST
Analyzes business needs and database requirements




DATABASE DESIGNER
Designs the structure of the database




DATABASE DEVELOPER
Builds and optimizes the database



DATABASE ADMINISTRATOR (DBA)
Manages security, backups, and performance



APPLICATION DEVELOPER
Creates applications that interact with the database



BI DEVELOPER
Analyzes data for business insights

Types of Databases

Relational vs. Non-Relational

- **Relational DB:** Structured in tables (e.g., MySQL, PostgreSQL).
 - Example: A school database with Students and Courses.

Relational Databases

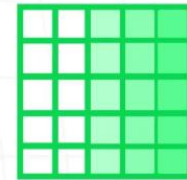


Table - based

Non Relational Databases

- **Non-Relational DB:** Flexible schemas (e.g., MongoDB stores JSON-like documents).
 - Example: Social media posts or user profiles in MongoDB.



Key - Value



Graph



Wide-column

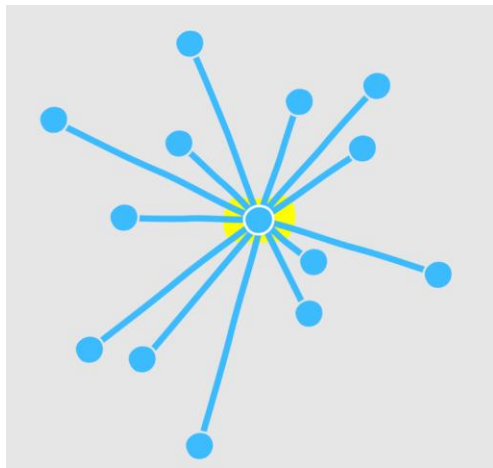


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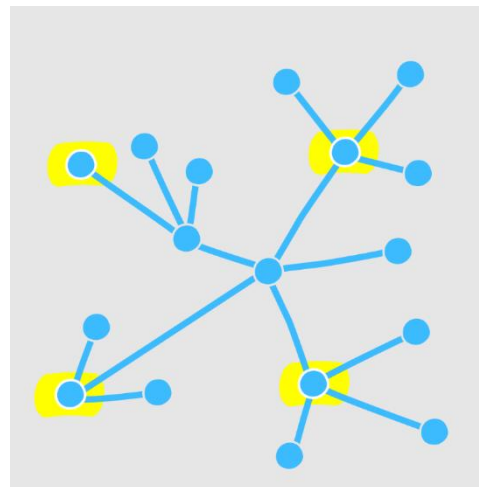
Elements of a Database	Relational Database	Non-Relational Database
DATA STRUCTURE	Table-based structure	Various data models
PERFORMANCE	Strong data consistency and integrity	Faster performance for specific use cases
SCALABILITY	Limited scalability	High scalability
QUERY LANGUAGE	Uses SQL for querying and manipulating data	Uses their own query languages or APIs
SCHEMA	Predefined scheme	Can accommodate various types of data
DEVELOPMENT	Require more development effort	Easier to develop and require fewer resources

Centralized vs. Distributed vs. Cloud

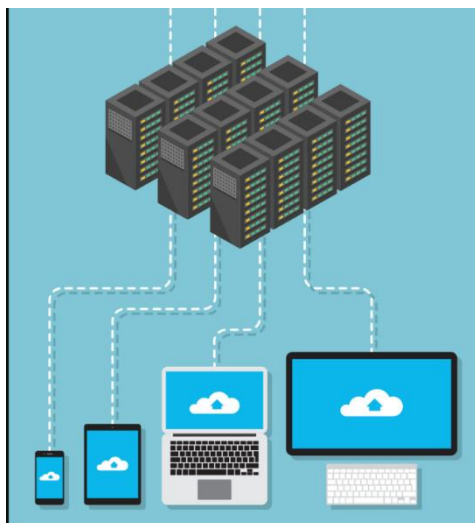
Type	Description	Example Use Case
Centralized	All data in one location.	Small businesses managing local inventory.
Distributed	Data spread across multiple locations.	Banks with branches in different cities.
Cloud	Hosted on cloud services. Scalable & accessible online.	E-commerce platforms using Amazon RDS.



Centralized



Distributed



Cloud Storage and Databases

What is Cloud Storage?

- Stores data on the internet via cloud providers (e.g., AWS, Azure).
- Can store both structured (SQL) and unstructured (NoSQL) data.

Advantages of Cloud Databases

- Scalability on-demand
- Automatic backups & updates
- Accessible from anywhere
- Integration with AI/analytics tools



Saves Space



No maintenance cost



No technical knowledge



Enhanced Security



Multi Device Access



Scalable



Prevents Data Corruption



Easy Upload and Download

Challenges

- Data privacy & security concerns
- Latency in high-speed applications
- Higher long-term cost for large-scale use

Refenes:

[Relational Database vs Flat File \(Differences & Similarities\)](#)

[Flat File vs. Relational Databases: Unraveling the Key Distinctions](#)

[What is a Database? - Cloud Databases Explained - AWS](#)